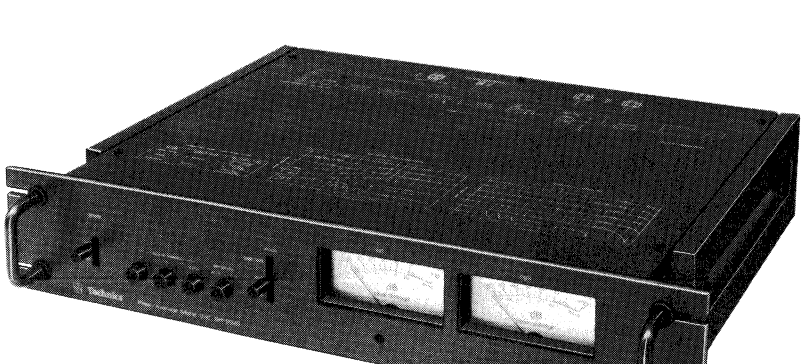
ORDER NO. SD7707-1254

Service Manual

Peak/Average Meter Unit

SH-9020

(X), (XG), (XGH), (XGF),
(XSD), (XSW), (XE)



- The model SH-9020 [X] is available in Asia, Latin America, Middle East and Africa only.
- The model SH-9020 [XG] is available in European only.
- The model SH-9020 [XGH] is available in Holland only.
- The model SH-9020 [XGF] is available in France only.
- The model SH-9020 [XSD] is available in Scandinavia only.
- The model SH-9020 [XSW] is available in Switzerland only.
- The model SH-9020 [XE] is available in England only.

TECHNICAL SPECIFICATIONS

Specifications are subject to change without notice for further improvement.

Input sensitivity and impedance		
SOURCE 1, 2	**(Sens. 0 dB)**	20 dBm (7.75V)/47kΩ
	(Sens. +20 dB)	0 dBm (0.775V)/47kΩ
SOURCE 3	**(Sens. 0 dB)**	100W/10kΩ
	(Sens. +20 dB)	1W/10kΩ
Sensitivity selector		0 dB, +20 dB
Frequency response		
+10 dB ~ −40 dB		10 Hz ~ 20 kHz, ±1.5 dB
less than −40 dB		10 Hz ~ 10 kHz, ±3 dB
Attack time	**average**	330msec.
	peak, peak hold	100μsec.
Recovery time	**average**	250msec. (0 dB→−20 dB)
	peak	750msec. (0 dB→−20 dB)
	peak hold	25 min. (0 dB→−3 dB)

Meter range	+10 dB ~ −50 dB
Indication accuracy	
SOURCE 1, 2	0 dB ±1.5 dB (input +20 dBm, Sens. 0 dB)
	0 dB ±1.5 dB (input 0 dBm, Sens. +20 dB)
SOURCE 3	0 dB ±2 dB (input 100W, Sens. 0 dB)
	0 dB ±2 dB (input 1W, Sens. +20 dB)
Power consumption	14W
Power supply (50 Hz/60Hz)	110V, 120V, 220V, 240V
Dimensions (W x H x D)	450 x 92 x 378mm (17-23/32" x 3-5/8" x 14-7/8")
Weight	5.6kg (12.3 lb.)

TECHNISCHE DATEN

Spezifikationen können infolge von Verbesserungen ohne Ankündigung geändert werden.

Eingangsempfindlicheit & Impedanz		
SOURCE 1, 2	**(Empfindlichkeit: 0 dB)**	20 dBm (7,75V)/47kΩ
	(Empfindlichkeit: +20 dB)	0 dBm (0,775V)/47kΩ
SOURCE 3	**(Empfindlichkeit: 0 dB)**	100W/10kΩ
	(Empfindlichkeit: +20 dB)	1W/10kΩ
Empfindlichkeits-Wahlschalter		0 dB, +20 dB
Frequenzgang		
+10 dB ~ −40 dB		10 Hz ~ 20 kHz, ±1.5 dB
weniger als −40 dB		10 Hz ~ 10 kHz, ±3 dB
Ausschlagzeit	**average**	330 msec
	peak, peak hold	100μsec
Rückfallzeit	**average**	250 msec (0 dB → −20 dB)
	peak	750 msec (0 dB → −20 dB)
	peak hold	25 Minuten (0 dB → −3 dB)

Meter Bereich	+10 dB ~ −50 dB
Anzeige-Genauighkeit	
SOURCE 1, 2	
0 dB ±1.5 dB (Eingang: +20 dBm, Empfindlichkeit: 0 dB)	
0 dB ±1.5 dB (Eingang: 0 dBm, Empfindlichkeit: +20 dB)	
SOURCE 3	
0 dB ±2 dB (Eingang: 100W, Empfindlichkeit: 0 dB)	
0 dB ±2 dB (Eingang: 1W, Empfindlichkeit: +20 dB)	
Leistungsaufnahme	14W
Netzspannung umschaltbar (50Hz/60Hz)	110V, 120V, 220V, 240V
Abmessungen (B x H x T)	450 x 92 x 378 mm
Gewicht	5.6 kg

CARACTERISTIQUES TECHIQUES

Sujet á changement sans préaris.

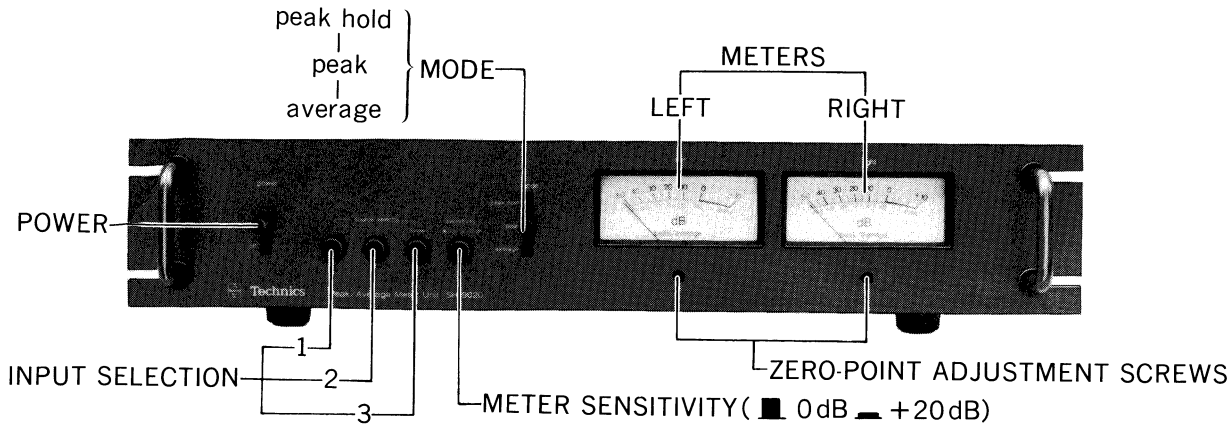
Sensibilité & impédance d'entrée		
SOURCE 1, 2	**(Sensibilité: 0 dB)**	20 dBm (7.75V)/47kΩ
	(Sensibilité: +20 dB)	0 dBm (0.775V)/47kΩ
SOURCE 3	**(Sensibilité: 0 dB)**	100W/10kΩ
	(Sensibilité: +20 dB)	1W/10kΩ
Sélecteur de sensibilité		0 dB, +20 dB
Réponse de fréquence		
+10 dB ~ −40 dB		10 Hz ~ 20 kHz, ±1.5 dB
moins de −40 dB		10 Hz ~ 10 kHz, ±3 dB
Temps d'"attaque"	**average**	330 msec
	peak, peak hold	100μsec
Temps de rétablissement	**average**	250 msec (0 dB→ −20 dB)
	peak	750 msec (0 dB→ −20 dB)
	peak hold	25 minutes (0 dB→ −3 dB)

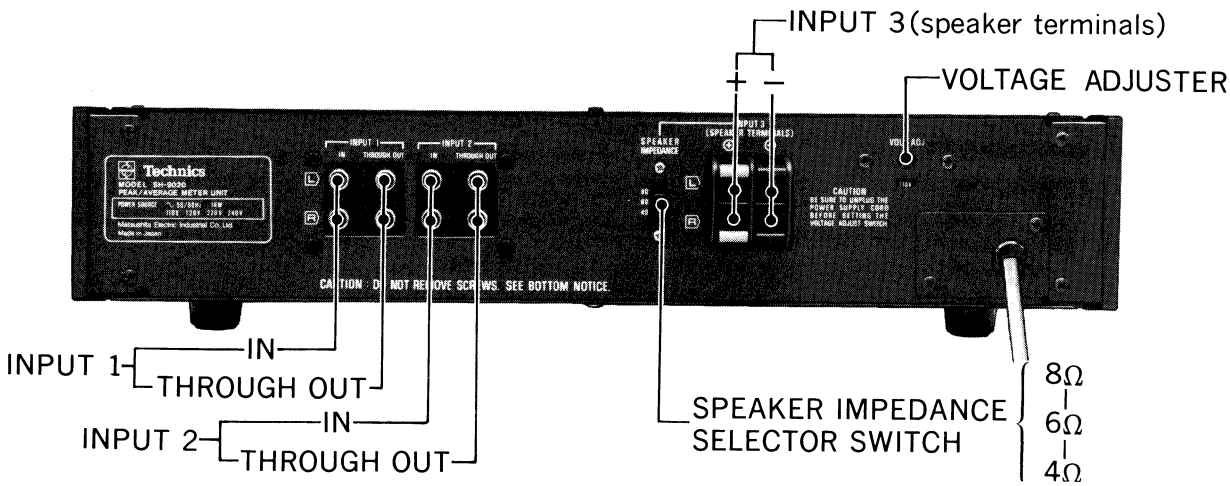
Plage des indicateurs	+10 dB ~ −50 dB
Précision de l'indication	
SOURCE 1, 2	
0 dB ±1.5 dB (Entrée: +20 dBm, Sensibilité: 0 dB)	
0 dB ±1.5 dB (Entrée: 0 dBm, Sensibilité: +20 dB)	
SOURCE 3 0 dB ±2 dB (Entrée: 100W, Sensibilité: 0 dB)	
0 dB ±2 dB (Entrée: 1W, Sensibilité: +20 dB)	
Consommation	14W
Alimentation (50 Hz/60 Hz)	110V, 120V, 220V, 240V
Dimensions (L x H x Pr)	450 x 92 x 378 mm
Poids	5.6 kg

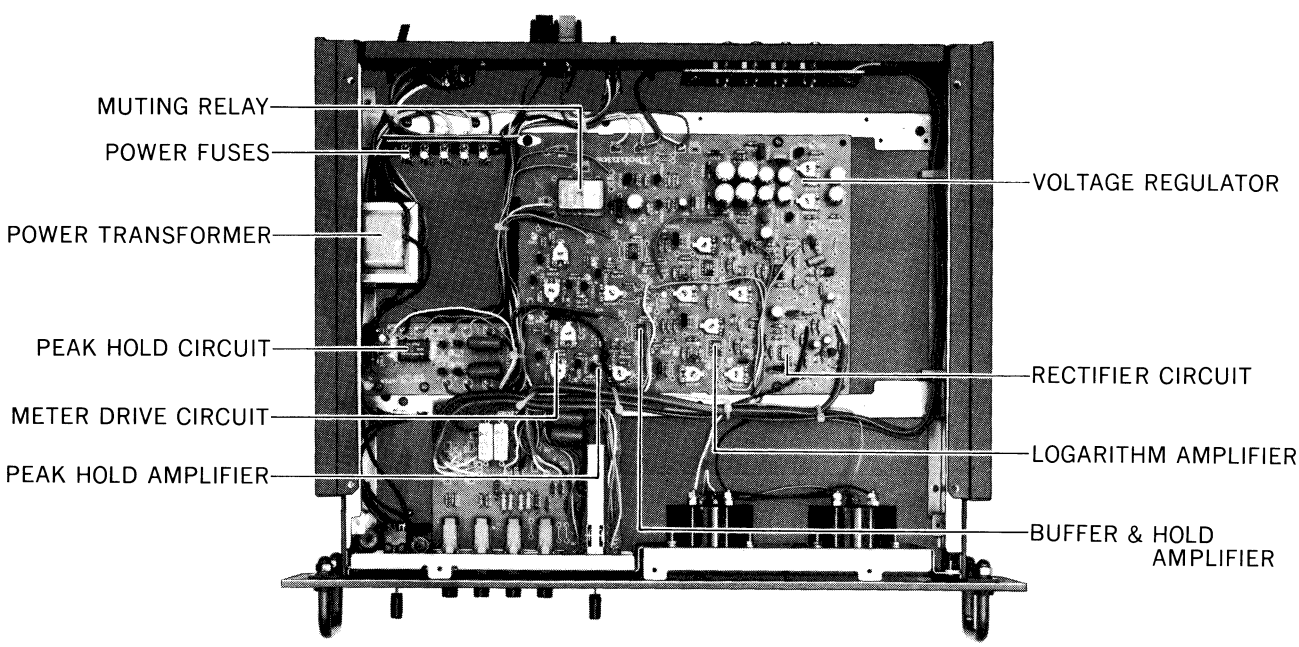
National Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

■ LOCATION OF CONTROLS







■ ABOUT PEAK-LEVEL METERS AND VU METERS

In order to faithfully transmit music signals that are short in duration, signals which include a great many "pulsing" sound components with high peak values and which invariably change in complex ways, every signal level in the system must be monitored as precisely as possible. For this purpose the VU meter—which indicates the average value of the signal level—and the peak-level meter—which indicates the peak value of the signal—have been used.
The VU meter and the peak-level meter function with a fundamentally different character, and each has its own superb features. Thus, in order to monitor the system at the highest possible level of precision, it is necessary to use these two types of meters correctly, depending upon the application and purpose, by using their respective features to maximum advantage.

- **VU meters . . . . . What they are and do**

VU meters indicate the average value of the signal waveform (with an "attack" time of about 300msec), and are designed so that the indication needles move in very close relationship to the perception of sound volume.
VU meters are convenient for monitoring sound volume, and are especially convenient when used for monitoring the levels when mixing various signals which have different peak values, thus making it possible to perform the mixing without differences in the volume level.
Because the meters in this unit—when used as average meters—function with performance which is equal to that of VU meters which have an "attack" time of 330 msec and a recovery time of 250msec, they can be used to check the level in the same way as VU meters.
Note, however, that, for VU meters, 0 VU indicates a signal level of 1.228V at 600Ω, but, when the meters of this unit are used as average meters, the −16dB point is equivalent to 0 VU (with the meter sensitivity selection pushbutton set to 0dB).

- **Peak-level meters . . . . . What they are and do**

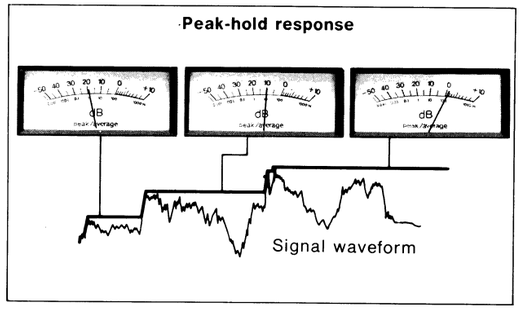
Peak-level meters are designed to indicate the peak value of the signal waveform, and, because they must be able to precisely indicate the peak values even of short, "pulsing" sounds of short duration, they have extremely fast response characteristics.
In order to faithfully transmit such signals as music signals, which include a great many peaks, it is necessary to monitor the peak values precisely, and they are especially indispensable meters for effectively making use of the peak factor of audio equipment.
The meters in this unit—when used as peak-level meters—have an especially fast response characteristic, with an "attack" time of 100μsec, resulting in precise indication of virtually 0dB with relation to an input signal of 10kHz, single wave.

■ ABOUT PEAK HOLD

"Peak hold" is a feature which permits the meters to continuously indicate the maximum peak value detected by the peak meters. This system is designed so that it requires 25 minutes or more for the indication to return from 0dB to −3dB under no-signal conditions.
In order to most effectively take advantage of the peak factors of audio equipment, it is necessary to be able to precisely determine the maximum peak value of the program source. The peak-hold feature, therefore, makes it possible to continuously maintain the maximum peak value of signals such as music—with constantly changing peak values—at the complete value for a long period of time, thus making it possible to pre-set to the correct recording level before beginning to record.

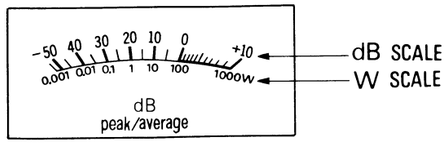
- **Peak-hold response characteristic**

- As explained previously, the peak-hold feature can be used to maintain the indication of the maximum peak value of the program source for 25 minutes or more. This makes it possible to get the indication of only the peak signal, even for signals in which there are complex changes in the peak value.



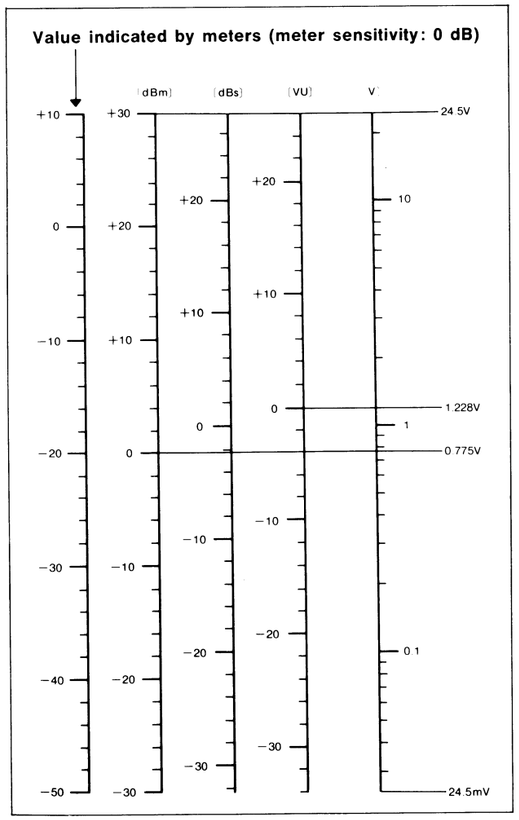
- As can be seen from the figure above, it is possible to use this feature to visually determine the maximum peak value easily, because the peak value indicated first continues to be indicated until a higher peak output is detected, and so on.

■ ABOUT THE INDICATED VALUES



- **Indication of decibels (dB)**

- The outer (upper) scale is calibrated in dBm units and defines the signal level of 0.775V (1mW) at 600Ω to be 0dB. When the meter sensitivity selection pushbutton is set to 0dB, the meters will indicate −20dB at an input of 0dBm. When the pushbutton is set to +20dB, the meters will indicate 0dB at an input of 0dBm.
For VU meters, an indication of 0 VU indicates a signal level of 1.228V at 600Ω. For this unit, however, the −16dB point becomes equivalent to 0 VU (when the meter sensitivity selection pushbutton is set to 0dB).
The relationships between dBm, dBs, VU and voltage are shown below.
* At the level usually used, a 1V signal level is defined to be 0dBs.



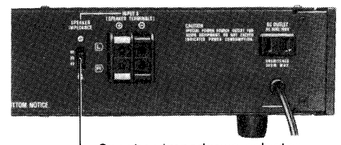
- In addition to being used for checking the recording level and the Output level, the dB scale can also be used, by playing a frequency-check record, to check the frequency response of a phonograph cartridge or to check channel separation, etc.

- **W indication**

- When this unit is used as a power meter, the inner (lower) scale of the meters should be used.
The W scale is calibrated in output values at a pure resistance load which is equivalent to nominal resistance.
When the meter sensitivity selection pushbutton is set to the 0dB position, power is indicated in the range shown (1mW ~ 1000W) on the meters. When it is set to +20dB, the actual value of the power is 0.01 of the indicated value (thus, a range of 0.01 mW ~ 10W).

- Impedance correction

Because the values indicated on the meters (when they are used as power meters) are different depending upon the impedance of the speakers used, it is necessary to use the speaker impedance selector (on the rear panel) to make the impedance correction.
If the speakers to be used have an impedance of 8 ohms, set the switch to the 8Ω position. For speakers with a 6-ohm impedance set to 6Ω, and for a 4-ohm impedance set to 4Ω.
Note that meter readings will be incorrect if the correct setting is not made to correspond with the impedance of the speakers.



* If the speakers have an impedance different from any of those indicated, set the selector to the closest approximate value.
Actual output is then calculated in the following way: (Value indicated on meters) × (Selector setting ÷ Impedance of speakers used).
If, for example, the selector is set to 8Ω for speakers of 16-ohm impedance, multiply the value indicated on the meters by 1/2 to determine the actual output.
* When the Technics models SE-9060 is used for Balanced-Transformerless operation, set the speaker impedance selector to a value which is 1/2 of the impedance of the speakers to be used.
If, for example, the speaker impedance is 8Ω, set the selector to the "4Ω" position.

■ METER

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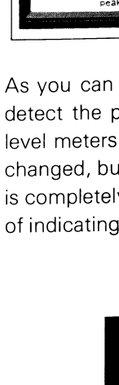

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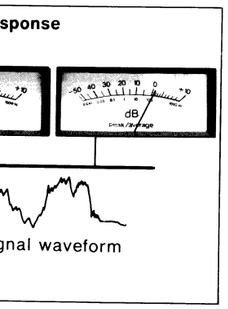

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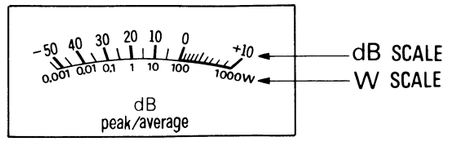
■ ABOUT THE INDICATED VALUES



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  For VU meters, an indication of 0 VU indicates a signal level of 1.228V at 600Ω. For this unit, however, the −16dB point becomes equivalent to 0 VU (when the meter sensitivity selection pushbutton is set to 0dB).
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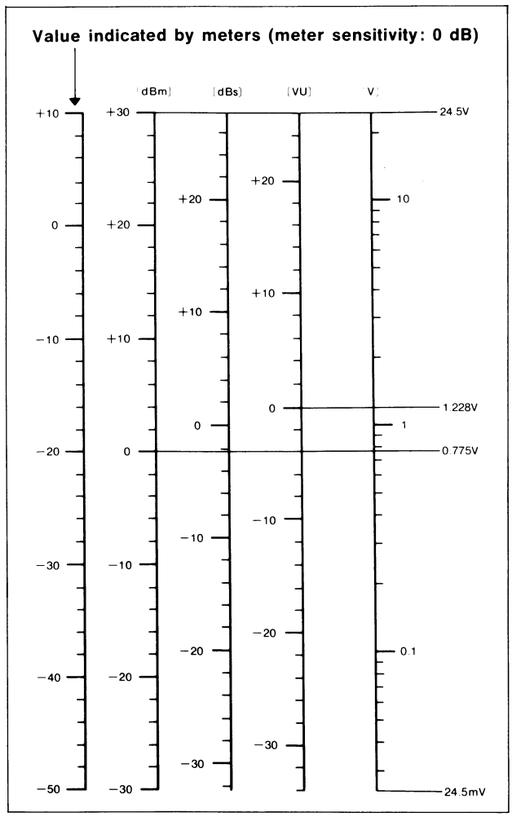
  * At the level usually used, a 1V signal level is defined to be 0dBs.



- In addition to being used for checking the recording level and the Output level, the dB scale can also be used, by playing a frequency-check record, to check the frequency response of a phonograph cartridge or to check channel separation, etc.

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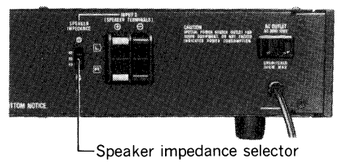
- Impedance correction

  Because the values indicated on the meters (when they are used as power meters) are different depending upon the impedance of the speakers used, it is necessary to use the speaker impedance selector (on the rear panel) to make the impedance correction.
  If the speakers to be used have an impedance of 8 ohms, set the switch to the 8Ω position. For speakers with a 6-ohm impedance set to 6Ω, and for a 4-ohm impedance set to 4Ω.
  Note that meter readings will be incorrect if the correct setting is not made to correspond with the impedance of the speakers.



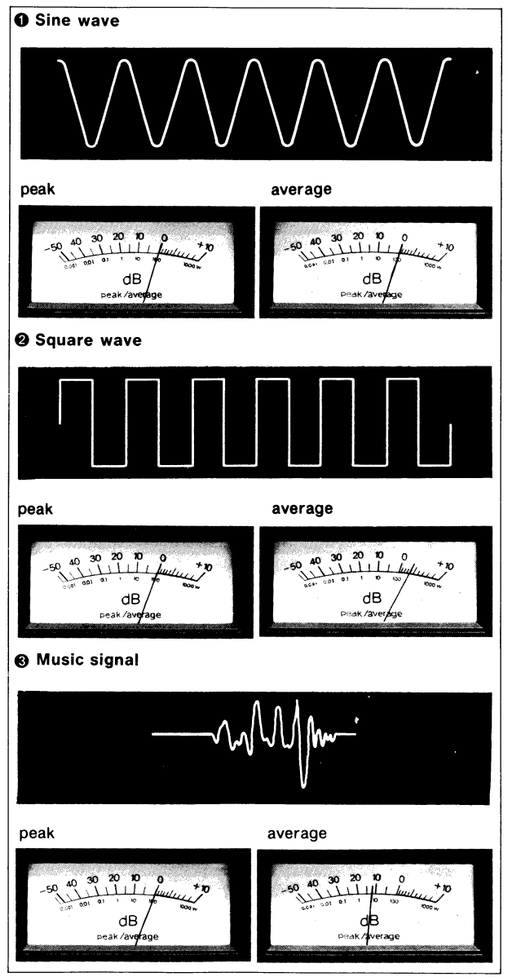
* If the speakers have an impedance different from any of those indicated, set the selector to the closest approximate value.
  Actual output is then calculated in the following way: (Value indicated on meters) × (Selector setting ÷ Impedance of speakers used).
  If, for example, the selector is set to 8Ω for speakers of 16-ohm impedance, multiply the value indicated on the meters by 1/2 to determine the actual output.
* When the Technics models SE-9060 is used for Balanced-Transformerless operation, set the speaker impedance selector to a value which is 1/2 of the impedance of the speakers to be used.
  If, for example, the speaker impedance is 8Ω, set the selector to the "4Ω" position.

■ METER RESPONSE CHARACTERISTICS FOR VARIOUS SIGNAL WAVEFORMS

Because, as explained previously, the response characteristics of peak-level meters and of average meters are different, the two types of meters would indicate two completely different values when the waveform and the duration are different. In the figures below, the indicated values for the two types of meters are shown. The pake value is held constant, and the waveform or the duration are varied.

- **When the waveform is changed**

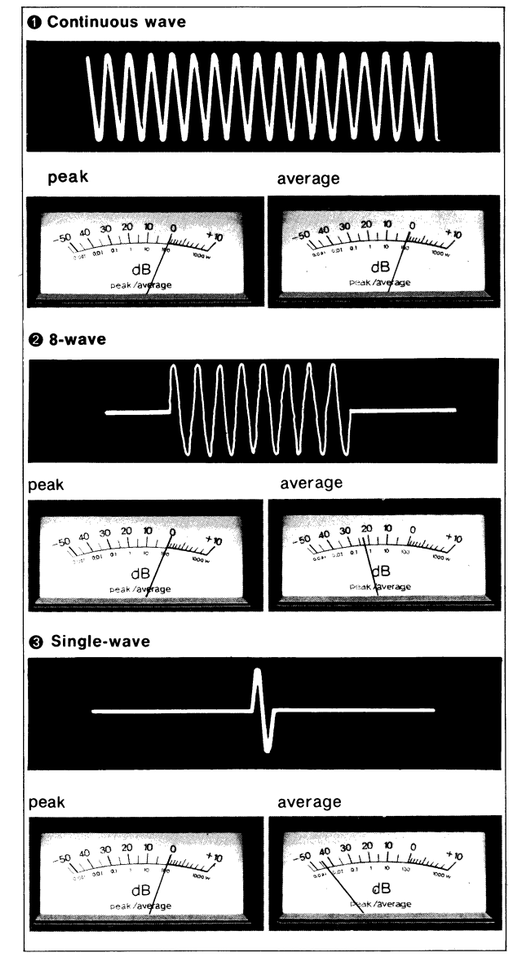
- These figures show the indicated values for 3 types of signal levels with different waveforms. The peak-level meter is shown at the left, and the average meter at the right.



- As you can understand from the above, in order to detect the peak value, the indicated value of peak-level meters doesn't change even if the waveform is changed, but, for average meters, the indicated value is completely different in order to fulfill their function of indicating the average value.

- **When the duration is changed**

- These figures shown the indicated values for 3 types of signal levels with different waveform durations.
  The peak-level meter is shown at the left, and the average meter at the right.



- Peak-level meters have a fast response...with an "attack" time of 100μ sec or less, so that the indicated value doesn't change even for signals of short duration, because the value is indicated after being held for a short time. For average meters, however, the deflection of the indication needles is almost exactly equivalent to the perceived "feeling" of the sound volume. Because the "attack" time is set to be 330 msec, therefore, average meters cannot properly respond to signals of short duration, and their indication is lower than that of peak-level meters.

Schematic Diagram ... Model SH-9020

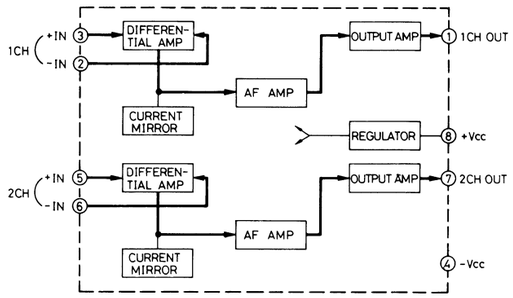
Notes:

1. **S1**(L)(R): Input 1 switch in "**push (ON)**" position.
2. **S2**(L)(R): Input 2 switch in "**OFF**" position.
3. **S3**(L)(R): Input 3 switch in "**OFF**" position.
   S1, 2 and 3 switches are interlocked with each other; if one is pushed in, the other will return outward auto-matically.
4. **S4**(L)(R): Meter sensitivity selector switch in "**0dB**" position.
   ■ 0dB ↔ ▂ +20dB
5. **S5-1 ~ S5-5**: Mode switch in "**peak**" position.
   (1) peak hold ↔ (2) peak ↔ (3) average
6. **S6**(L)(R): Input 3 (speaker) impedance selector switch in "**6Ω**" position.
   (1) 8Ω ↔ (2) 6Ω ↔ (3) 4Ω
7. **S7**: Power source switch in "**OFF**" position.
8. **S8**: Voltage selector switch in "**240V**" position.
   (1) 110V ↔ (2) 120V ↔ (3) 220V ↔ (4) 240V
9. ▭ Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high impedance) with the chassis taken as standard, Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
10. ⟹ Marks are signal line.
11. This schematic diagram may be modified at any time with the development of new technology.

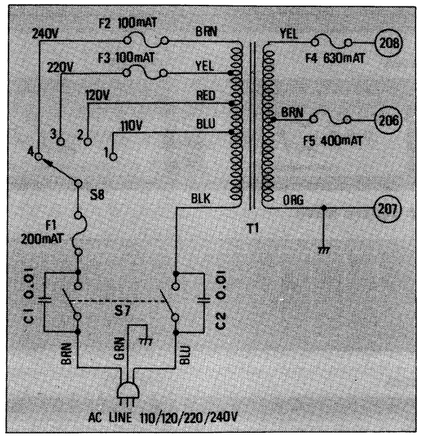
IMPORTANT SAFETY NOTICE
THE SHADED AREA ON THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR SAFETY.
WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTUR'S SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SHADED AREAS OF THE SCHEMATIC.

■ BLOCK DIAGRAM OF I.C.

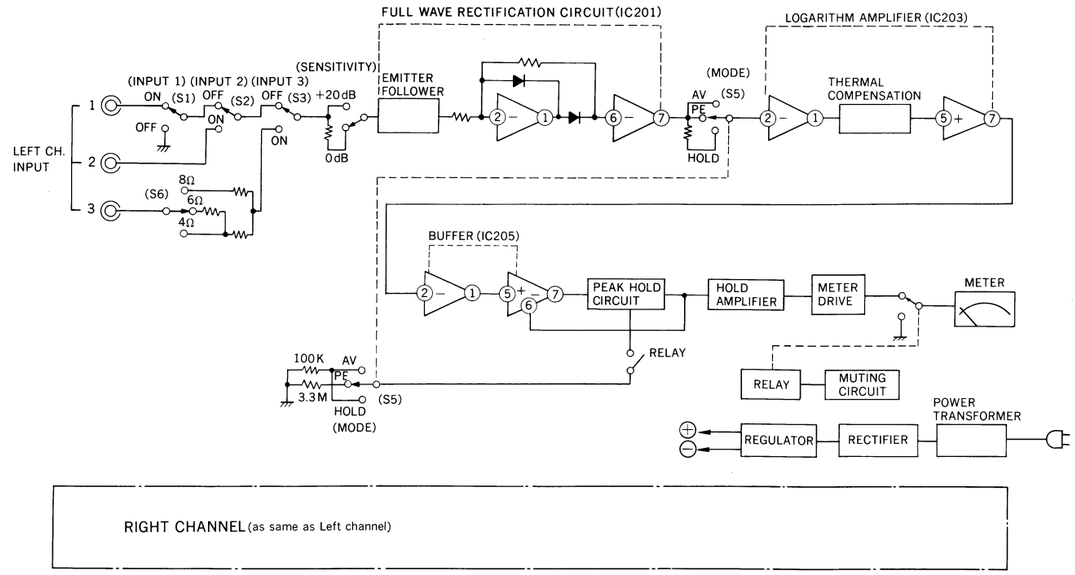
(SVINJM4558DS or SVINJM4558DG)

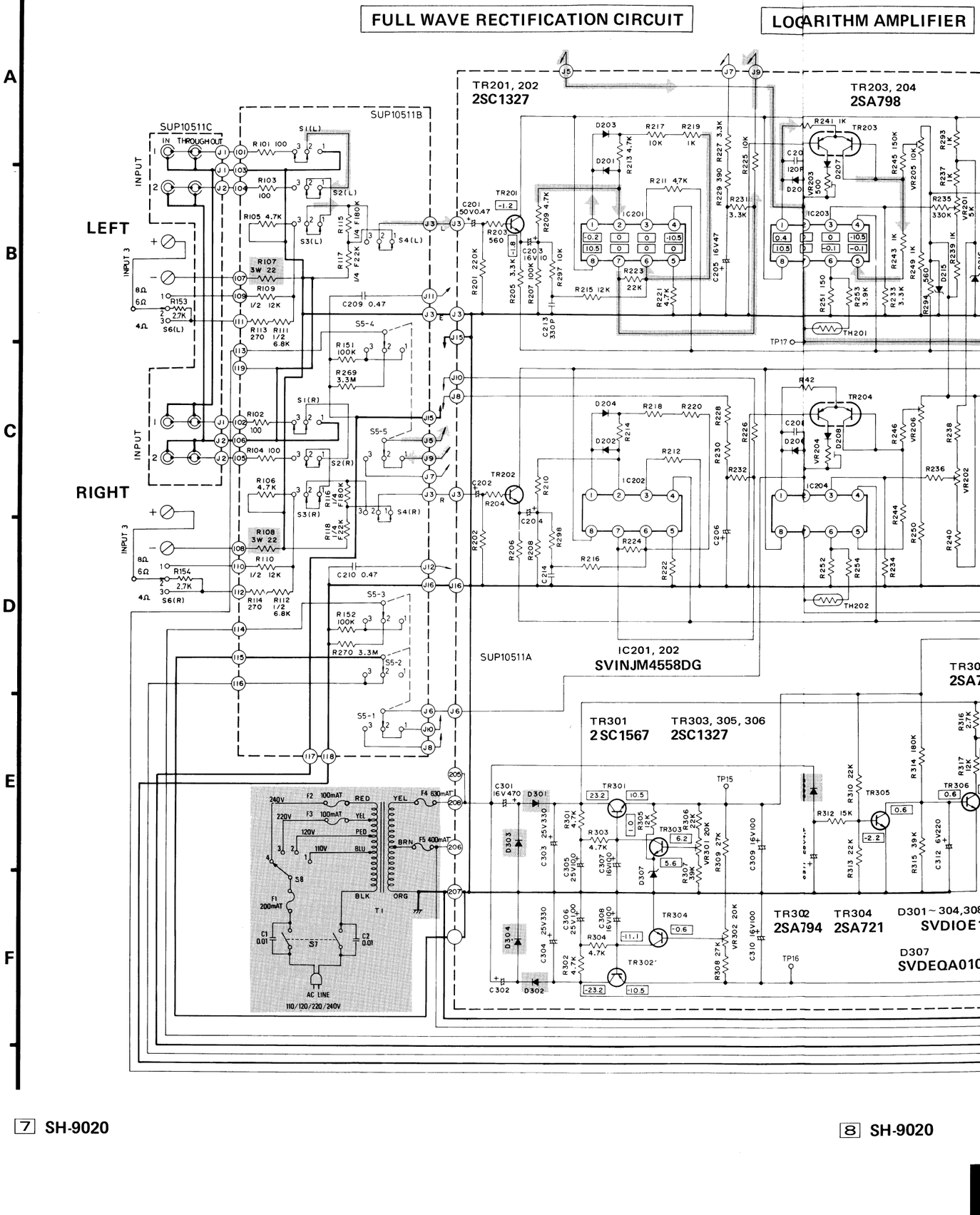


■ POWER SOURCE OF PRODUCTS FOR ENGLAND (XE)



■ BLOCK DIAGRAM





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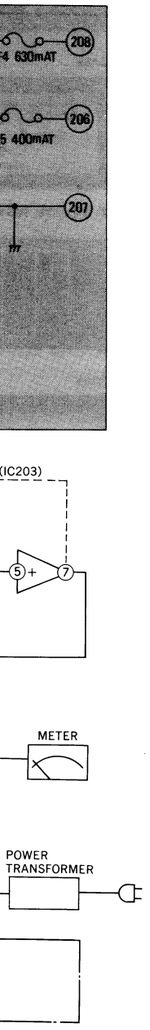
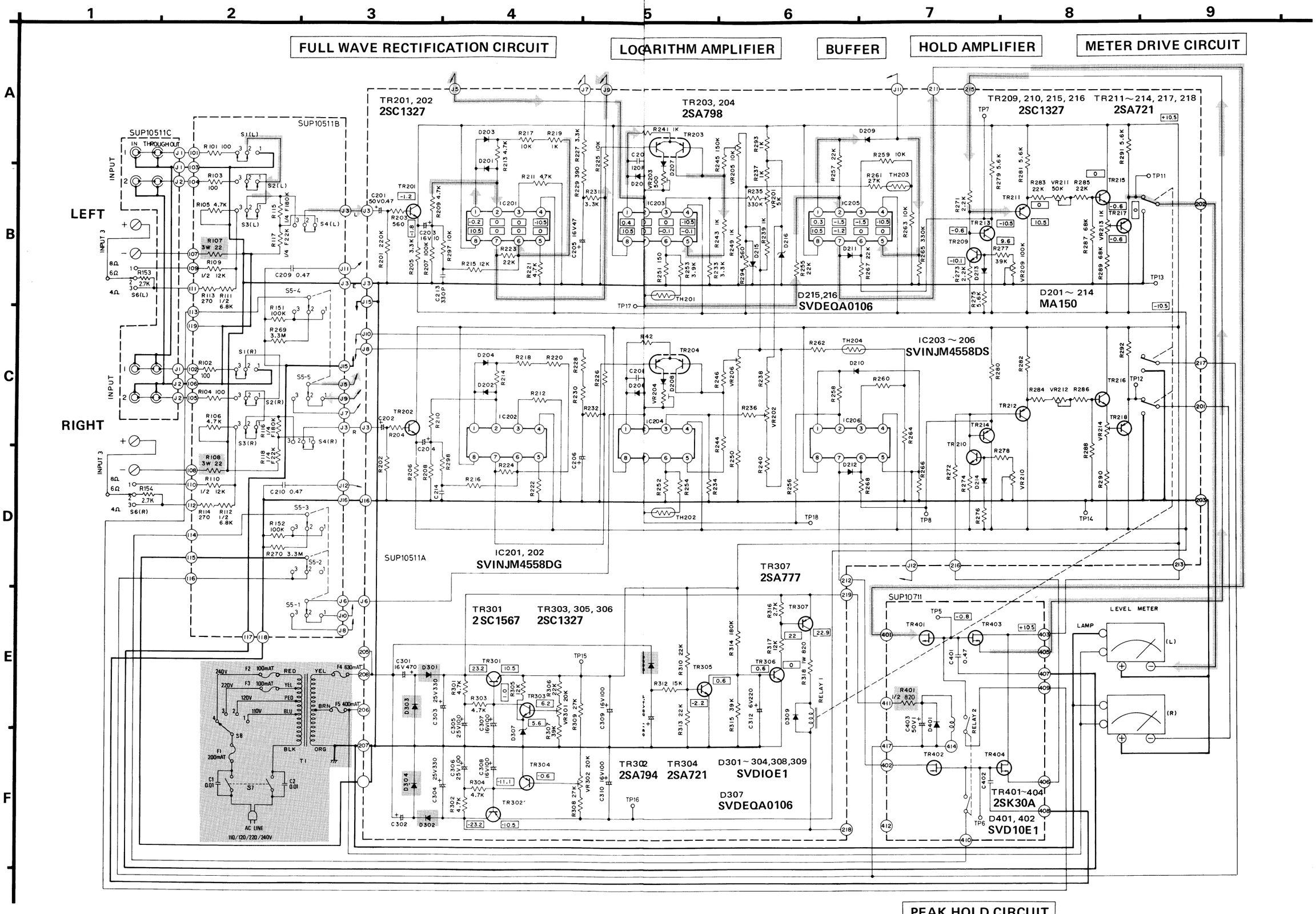
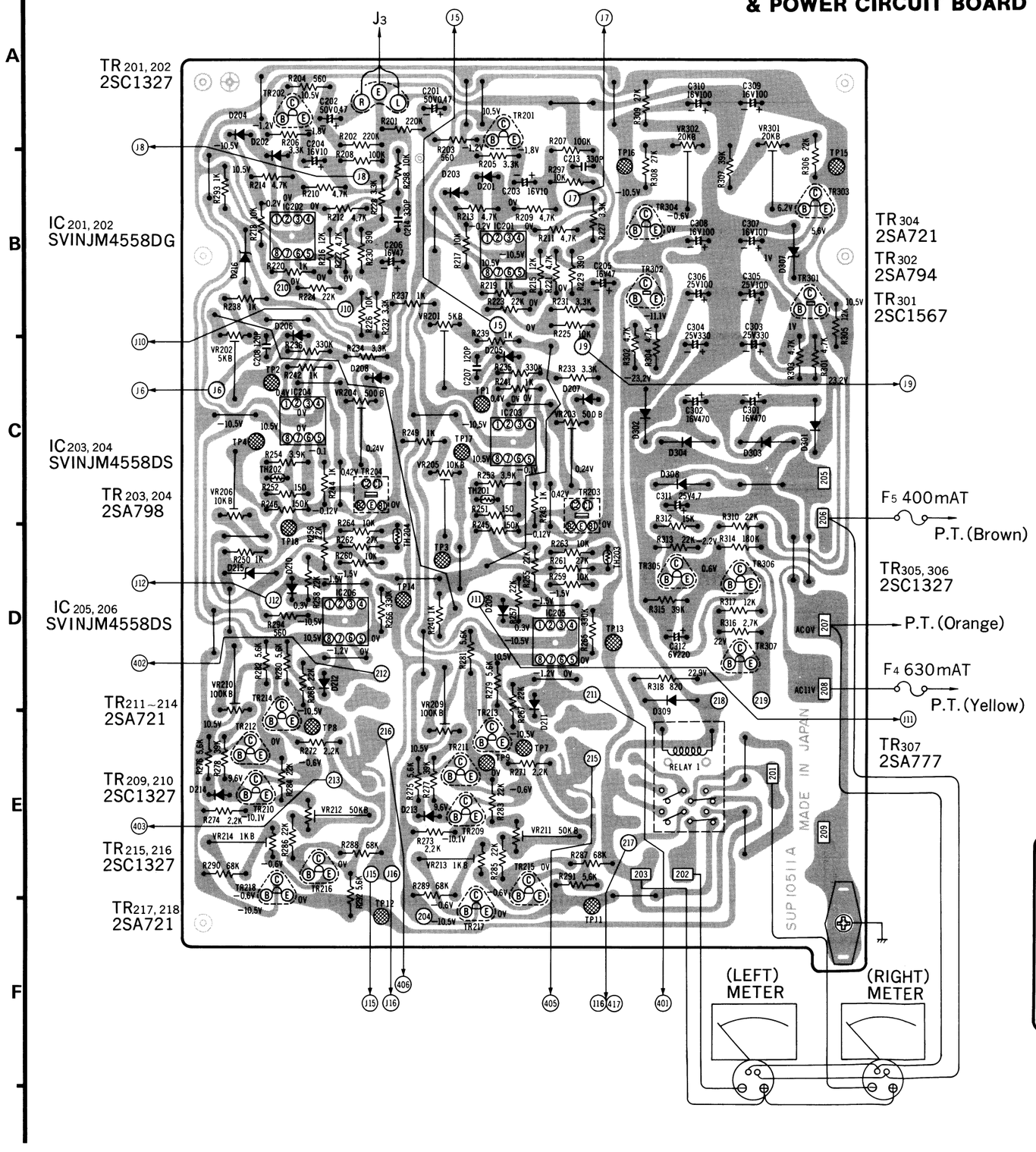
LAND (XE)

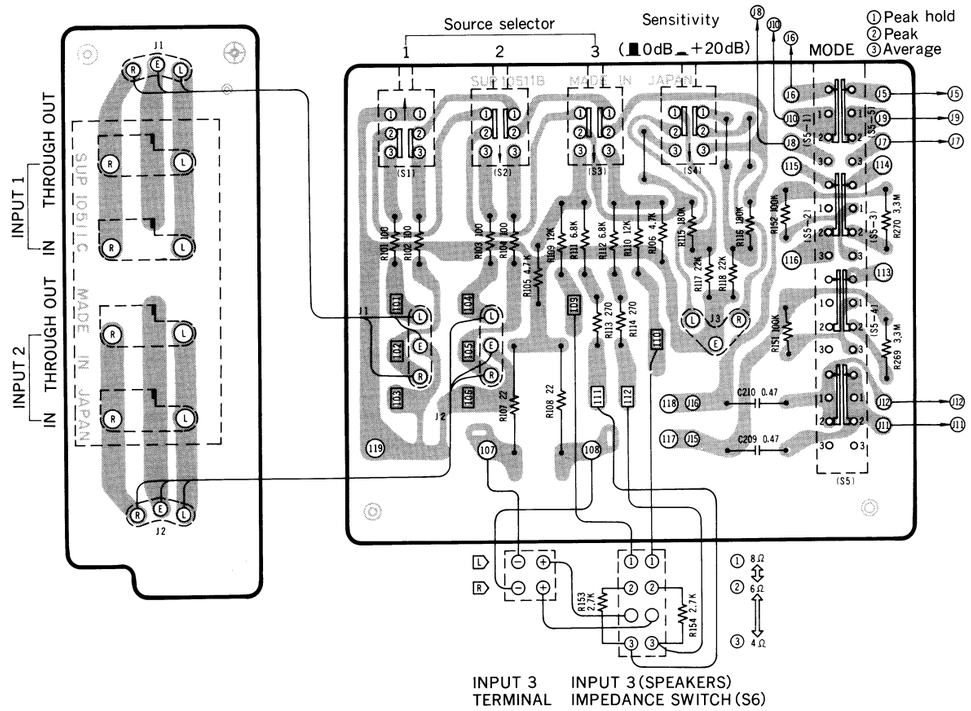




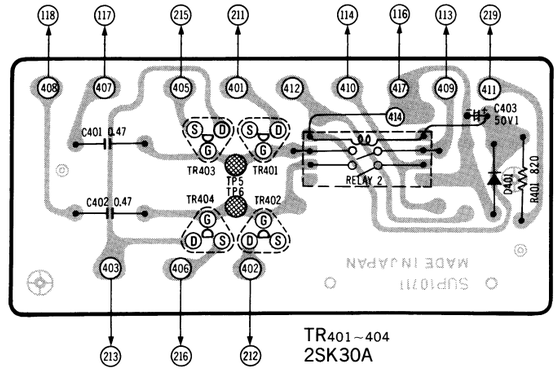
■ FULL WAVE RECTIFICATION , LOG AMP, BUFFER, HOLD AMP, METER DRIVE & POWER CIRCUIT BOARD



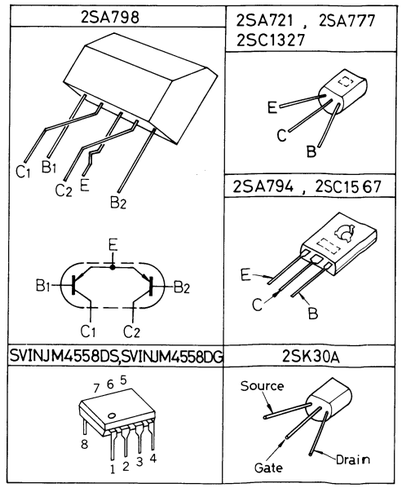
■ SWITCHES CIRCUIT BOARD



■ PEAK HOLD CIRCUIT BOARD



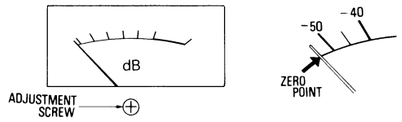
■ TERMINAL GUIDE



■ ALIGNMENT INSTRUCTIONS

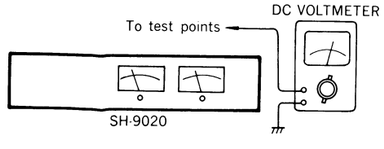
- Preparation of instruments and appliacnes to be used.
  1. DC voltmeter (AC VTVM).
  2. Audio frequency oscillator.
  3. Attenuator.

- Condition of the set.
  1. Power switch to "ON"
  2. Not apply signal to set.
  3. Connect DC voltmeter to connection points of DC voltmeter.
  4 Meter sensitivity switch to "0 dB"

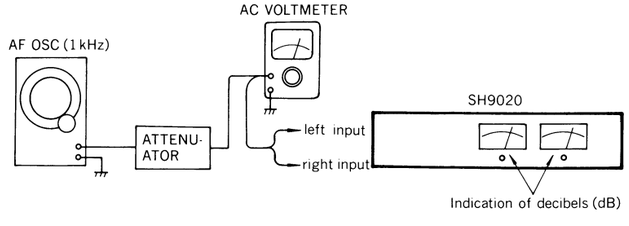
	CONNECTION POINTS OF DC VOLTMETER	ADJUSTMENT VOLUMES	REMARKS
	① VOLTAGE STABLIZER CIRCUIT ALIGNMENT		
1	Between TP15 and chassis	VR301	Adjust for +10.5V (±0.1V) of DC voltmeter indication.
2	Between TP16 and chassis	VR302	Adjust for −10.5V (±0.1V) of DC voltmeter indication.
	② LOGARITHM AMPLIFIER VOLTAGE ALIGNMENT		
1	Between TP17 and chassis	VR201	Adjust for −3.5V (±0.5V) of DC voltmeter indication.
2	Between TP18 and chassis	VR202	Adjust for −3.5V (±0.5V) of DC voltmeter indication.
	③ HOLD AMPLIFIER BIAS ALIGNMENT		
1	• Short to between TP5 and chassis • Connect DC voltmeter to between TP7 and chassis.	VR209	Adjust for +0.8V (±0.05V) of DC voltmeter indication.
2	• Short to between TP6 and chassis. • Connect DC voltmeter to between TP8 and chassis.	VR210	Adjust for +0.8V (±0.05V) of DC voltmeter indication.
	④ ZERO (0) POINT ALIGNMENT OF METERS		
	1. Power switch to "OFF". 2. Adjust for zero point of meter indication by meter adjustment screw.		
	⑤ METER DRIVE AMPLIFIER ALIGNMENT		
1	• Not connection DC voltmeter. • Power switch to "ON".	VR213 (left channel)	Adjust VR213 for zero point on meter indication.
2	• Not connection DC voltmeter. • Power switch to "ON".	VR214 (right channel)	Adjust VR214 for zero point on meter indication.

Notes: For adjustments of ⑥ to ⑨, apply 1kHz signal of each indicated level simultaneously to left and right channel.
(At this time 0dBm = 0.775V)

INPUT SIGNAL LEVEL	ADJUSTMENT VOLUMES	REMARKS
⑥ −20 dB SIGNAL LEVEL ALIGNMENT		
Apply −20 dBm (77.5mV) to set	VR205(left channel) VR206(right channel)	Adjust for "−20 dB" of meter indication (left and right channel).
⑦ −50 dB SIGNAL LEVEL ALIGNMENT		
Apply −50 dBm (2.45mV) to set	VR201 (left channel) VR202 (right channel)	Adjust for "−50 dB" of meter indication. (left and right channel).
⑧ +10 dB SIGNAL LEVEL ALIGNMENT		
Apply +10 dBm (2.45V) to set	VR203 (left channel) VR204 (right channel)	Adjust for "+10 dB" of meter indication. (left and right channels)
⑨ ADJUSTMENT OF METER INDICATION INTERVAL		
Apply −30 dBm (24.5mV), −20 dBm (77.5mV), −10 dBm (0.245V) and 0 dBm (0.775V).	VR211 (left channel) VR212 (right channel)	Adjustment so that the meter indication is at equal interval.

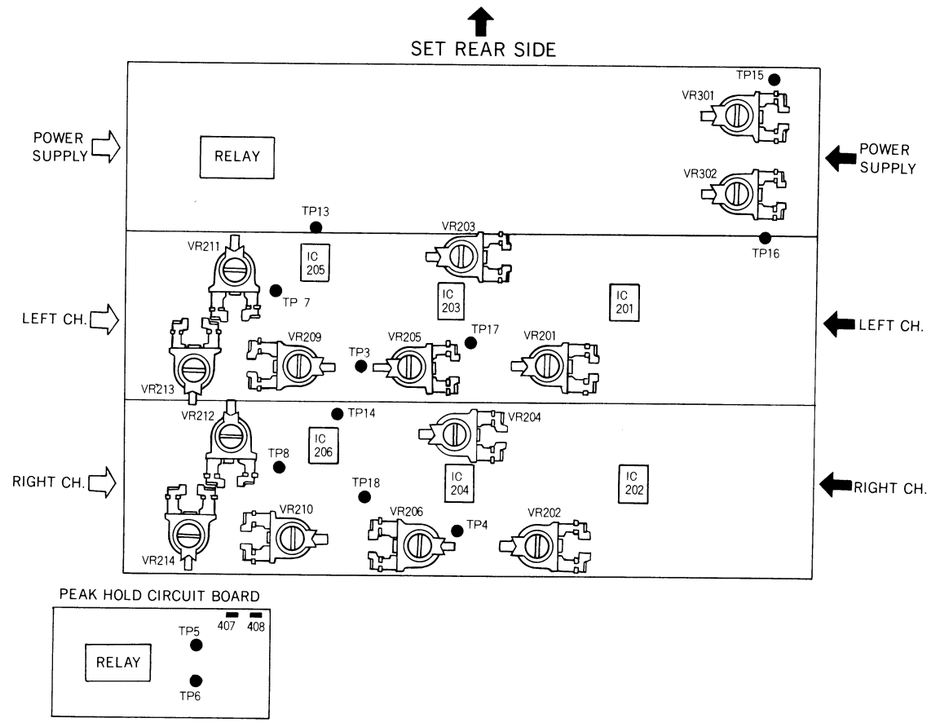


Alignment of setps ①~⑤



Alignment of steps ⑥~⑨

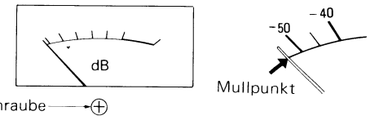
■ ALIGNMENT POINTS



■ ABGLEICHANWEISUNGEN

- Vorbereitung der zu verwendenden Instrumente und Geräte.
  1. Gleichstrom-Voltmeter (Wechselstrom-Röhrenvoltmeter)
  2. NF-Generator
  3. Abschwächer

- Zustand des Gerätes
  1. Netzschalter auf "ON"
  2. Dem Gerät kein Signal zuleiten
  3. Den Gleichstrom-Voltmeter an die Anschluß stellen für den Voltmeter anschließen.

	Anschlußpunkte für den Gleichstrom-Voltmeter	Abzustimmende Teile	Bemerkungen
	① SPANNUNGSGLEICHSCHALTUNGSKREIS-ABGLEICHUNG		
1	Zwischen TP15 und Chassis	VR301	Auf eine Voltmeteranzeige von +10,5V (±0,1V) abstimmen.
2	Zwischen TP16 und Chassis	VR302	Auf eine Voltmeteranzeige von −10,5V (±0,1V) abstimmen.
	② LOGARITHMUSVERSTÄRKERSPANNUNG-ABGLEICHUNG		
1	Zwischen TP17 und Chassis	VR201	Auf eine Voltmeteranzeige von −3,5V (±0,5V) abstimmen.
2	Zwischen TP18 und Chassis	VR202	Auf eine Voltmeteranzeige von −3,5V (±0,5V) abstimmen.
	③ HALTEVERSTÄRKER-VORMAGNETISIERUNGS-ABGLEICHUNG		
1	• Zwischen TP5 und Chassis kurzschließen. • Gleichstrom-Voltmeter zwischen TP7 und Chassis anschließen.	VR209	Auf eine Gleichstrom-Voltmeteranzeige von +0,8V (±0,05V) abstimmen.
2	• Zwischen TP6 und Chassis kurzschließen. • Gleichstrom-Voltmeter zwischen TP8 und Chassis anschließen.	VR210	Auf eine Gleichstrom-Voltmeternzeige von +0,8V (±0,05V) abstimmen.
	④ NULLPUNKT-ABGLEICHUNG DER METER		
	1. Netzschalter auf "OFF". 2. Mittels der Meterjustierschraube den Zeiger auf den Nullpunkt justieren.		

	⑤ METERANTRIEBVERSTÄRKER-ABGLEICHUNG		
1	• Gleichstrom-Voltmeter nicht anschließen. • Netzschalter auf "ON".	VR213 (linker Kanal)	VR213 auf Nullpunkt der Meteranzeige abstimmen.
2	• Gleichstrom-Voltmeter nicht anschließen. • Netzschalter auf "ON".	VR214 (rechter Kanal)	VR214 auf Nullpunkt der Meteranzeige abstimmen.

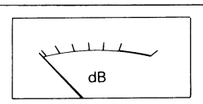
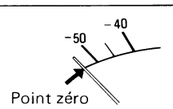
Anmerkung: Zur Abgleichung der Punkte ⑥ bis ⑨, führen Sie ein 1 kHz-Signal von jedem angegebenen Pegel gleichzeitig dem linken und rechten Kanal zu (Zu dieser Zeit 0 dBm = 0,775V).

EINGANGSSIGNAIPEGEL	ABZUSTIMMENDE TEILE	BEMERKUNGEN
⑥ –20 dB SIGNALPEGEL-ABGLEICHUNG		
–20 dBm (77,5mV) dem Gerät zuführen.	VR205 (linker Kanal) VR206 (rechter Kanal)	Auf eine Meteranzeige von "–20 dB" abstimmen.
⑦ –50 dB SIGNALPEGEL-ABGLEICHUNG		
–50 dBm (2,45mV) dem Gerät zuführen.	VR201 (linker Kanal) VR202 (rechter Kanal)	Auf eine Meteranzeige von "–50 dB" abstimmen.
⑧ +10 dB SIGNALPEGEL-ABGLEICHUNG		
+10 dBm (2,45V) dem Gerät zuführen.	VR203 (linker Kanal) VR204 (rechter Kanal)	Auf eine Meteranzeige von "+10 dB" abstimmen.
⑨ METERANZEIGE-INTERVALL-ABGLEICHUNG		
Dem Gerät –30 dBm (24,5mV) –20 dBm (77,5mV) –10 dBm (0,245V) und 0 dBm (0,775V) zuführen.	VR211 (linker Kanal) VR212 (rechter Kanal)	Auf Meteranzeige in gleichmäßigen Intervallen abstimmen.

■ INSTRUCTIONS D'ALIGNEMENT

• Préparation des appareils et équipements devant être utilisés.
1. Voltmètre à C.C. (Voltmèter électronique à C.A.).
2. Oscillateur de fréquence acoustique.
3. Atténuateur.

• Conditions de l'appareillage
1. Interrupteur d'alimentation sur "ON".
2. Ne pas appliquer de signal à l'appareillage.
3. Brancher le voltmètre C.C. aux points de raccordements du voltmètre à C.C.

	POINTS DE RACCORDEMENTS DU VOLTMETRE C.C.	VOLUMES DE REGLAGE	OBSERVATIONS
	① ALIGNEMENT DU CIRCUIT DU STAB ILISATEUR DE TENSION		
1	Entre TPI5 et le châssis.	VR301	Régler pour +10,5V (±0,1V) de l'ndication du voltmètre à C.C.
2	Entre TP16 et le châssis.	VR302	Régler pour –10,5V (±0,1V) de l'indication du voltmètre à C.C.
	② ALIGNEMENT DE LA TENSION DE L'AMPLIFICATEUR LOGARITHMIQUE		
1	Entre TP17 et le châssis.	VR201	Régler pour –3,5V (±0,5V) de l'indication du voltmètre à C.C.
2	Entre TP18 et le châssis.	VR202	Régler pour –3,5V (±0,5V) de l'indication du voltmètre à C.C.
	③ ALIGNEMENT DE LA TENSION DE POLARISATION DE L'AMPLIFICATEUR DE MAINTIEN		
1	• Court-circuiter entre TP5 et le châssis. • Brancher le voltmètre C.C. entre TP7 et le châssis.	VR209	Régler pour +0,8V (±0,05V) de l'indication du voltmètre à C.C.
2	• Court-circuiter entre TP6 et le châssis. • Brancher le voltmètre C.C. entre TP8 et le châssis.	VR210	Régler pour +0,8V (±0,05V) de l'indication du voltmètre à C.C.
	④ ALIGNEMENT DU POINT ZERO ("0") DES CADRANS DE MESURE		
	1. Interrupteur d'alimentation sur "OFF". 2. Régler pour le point zéro de l'indication du cadran de mesure, au moyen de la vis de réglage du cadran de mesure.		

	⑤ ALIGNEMENT DE L'AMPLIFICATEUR D'EXCITATION DU CADRAN DE MESURE		
	• Pas de branchement du voltmètre à C.C. • Interrupteur d'alimentation sur "ON".	VR213 (canal de gauche)	Régler VR213 pour obtenir le point zéro sur l'indication du cadran de mesure.
	• Pas de branchement du voltmètre à C.C. • Interrupteur d'alimentation sur "ON".	VR214 (canal de droite)	Régler VR214 pour obtenir le point zéro sur l'indication du cadran de mesure.

Nota: Pour les mises au point de "6" à "9", appliquer simultanément un signal de 1 kHz de chaque niveau indiqué, aux canaux de gauche et de droite. (A ce moment, 0 dBm = 0,775V).

NIVEAU DU SIGNAL D'ENTREE	VOLUMES DU REGLAGE	OBSERVATIONS
⑥ ALIGNEMENT DU NIVEAU DE TRANSMISSION DE –20 dB		
Appliquer –20 dBm (77,5mV) à l'appareil.	VR205 (canal gauche) VR206 (canal droit)	Régler pour "–20 dB" de l'indication du cadran de mesure, (canaux de gauche et de droite).
⑦ ALIGNEMENT DU NIVEAU DE TRANSMISSION DE –50 dB		
Appliquer –50 dBm (2,45mV) à l'appareil.	VR201 (canal gauche) VR202 (canal droit)	Régler pour "–50 dB" de l'indication du cadran de mesure, (canaux de gauche et de droite).
⑧ ALIGNEMENT DU NIVEAU DE TRANSMISSION DE +10 dB		
Appliquer +10 dBm (2,45V) à l'appareil.	VR203 (canal gauche) VR204 (canal droit)	Régler pour "+10 dB" de l'indication du cadran de mesure, (canaux de gauche et de droite).
⑨ REGLAGE D'INTERVALLE DE L'INDICATION DU CADRAN DE MESURE		
Appliquer –30 dBm (24,5mV), –20dBm (77,5mV), –10 dBm (0,245V), et 0 dBm (0,775V).	VR211 (canal gauche) VR212 (canal droit)	Régler de façon à ce que l'indication du cadran de mesure soit à un intervalle identique.

■ ATTACHMENT OF FEET (INCLUDED)

This unit has an extra set of 4 feet which, if installed, lower the height by 8 mm, to 84 mm.
These feet are especially useful if other audio components in this series (models SU-9070, SE-9060, ST-9030 and SH-9010) are stacked one on top of another.

• Attachment
① Remove the feet alread'y attached to the bottom of the unit.
② Attach the other set of feet (included) by using the screws (also included). Use the same holes as for the original feet.

* If the unit is used stacked on top of model SE-9060, note that the 2 feet toward the rear of the unit should be attached to the 2 holes indicated "Ⓐ" in the illustration. (fig. 2)

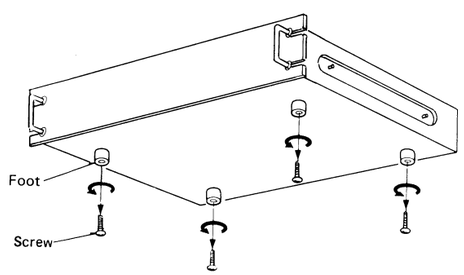


Fig. 1

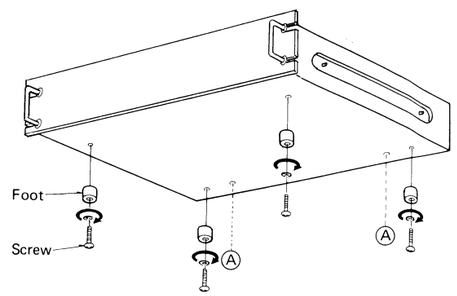
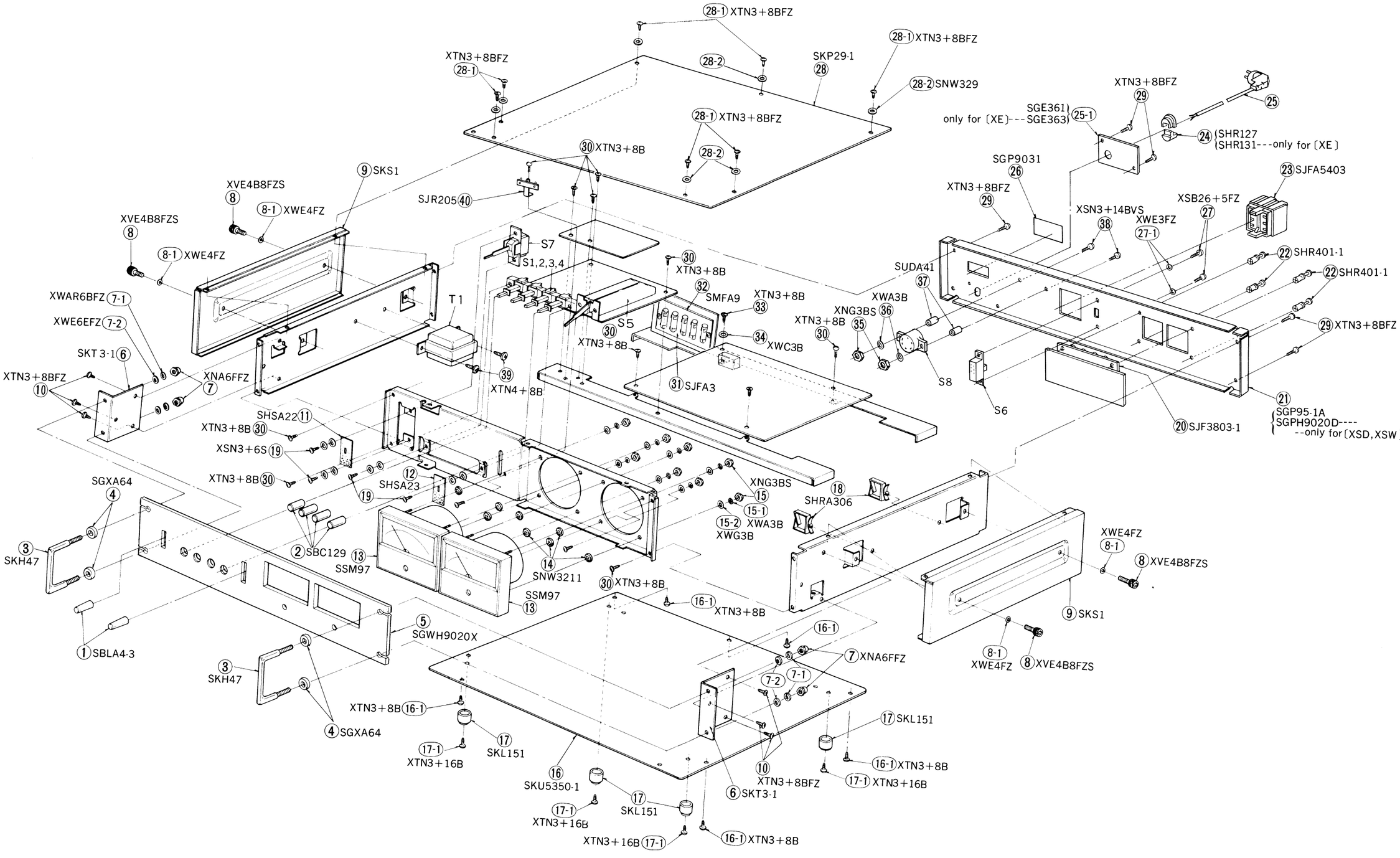


Fig. 2

■ EXPLODED VIEW



15 SH-9020

16 SH-9020

■ REPLACEMENT PARTS LIST

Important Safety Notice

Components identified by shaded area have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

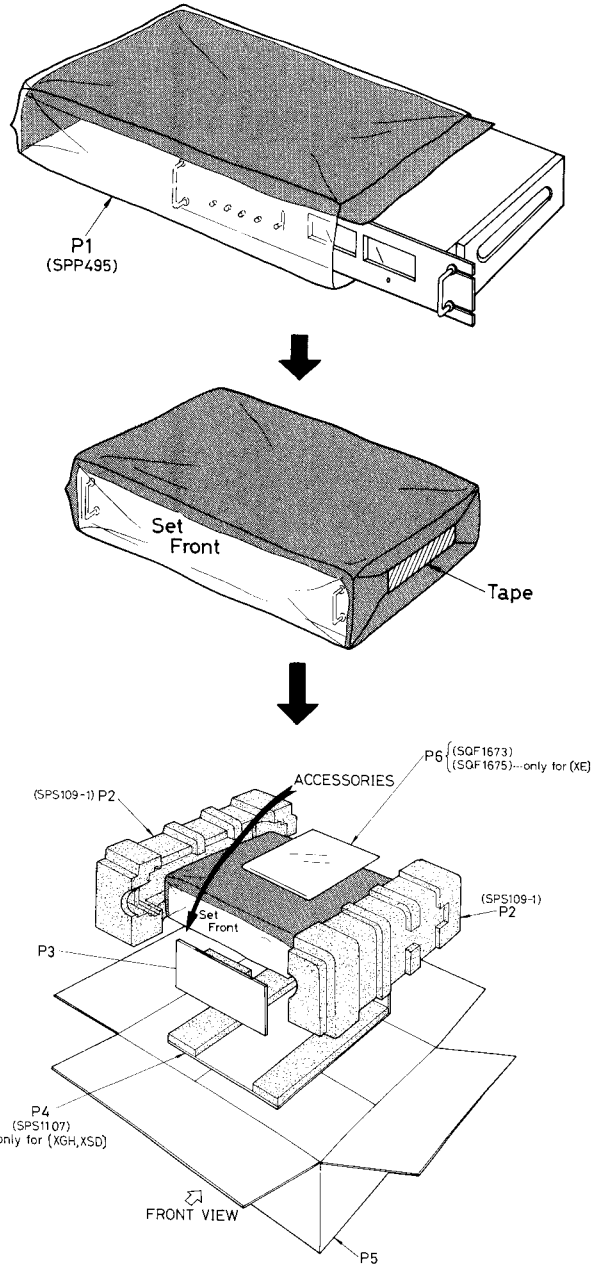
NOTE: 1. Part numbers are indicated on most mechanical parts.
Please use this part number for parts orders.

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
		INTEGRATED CIRCUITS		
IC201, 202	SVINJM4558DG	IC, Signal Rectifier Circuit	2	
IC203, 204 205, 206	SVINJM4558DS	IC, Logarithm Amplifier & Buffer Amplifier	4	
		TRANSISTORS		
TR201, 202, 209 210, 215, 216 303, 305, 306	**2SC1328-T**	Transistor, Emitter Follower, Hold Amplifier & Meter Drive Amplifier (Use in ranks S, T or U)	9	
TR203, 204	**2SA798A-G2**	Transistor, Differential (Use in ranks G2 or F2)	2	
TR301	2SC1567-Q	Transistor, Voltage Regulator (Use in ranks Q or R)	1	
TR302	**2SA794-Q**	Transistor, Voltage Regulator (Use in ranks Q or R)	1	
TR307	**2SA777-Q**	Transistor, Relay Driver (Use in ranks Q or R)	1	
TR211, 212, 213 214, 217, 218 304	**2SA902S-F**	Transistor, Hold & Meter Drive Amplifier (Use in ranks F or G)	7	
TR401, 402, 403 404	2SK30A-Y	Transistor (FET), Hold Amplifier	4	
		DIODES		
D201 ~ 214	MA150	Diode	14	
D215, 216, 307	SVDEQA0106R	Zener Diode, 6V	3	
D301 ~ 304, 308, 309, 401	**SM112**	Rectifier	7	
		TRANSFORMER		
T1	SLT5K79	Power Transformer	1	○
		THERMISTERS		
TH201, 202	RRT251	Thermistor	2	
TH203, 204	ERTD2FHK202S	Thermistor	2	
		RESISTORS		
R101, 102	**ERD25TJ101**	Carbon, 100Ω, 1/4W, ± 5%	2	
R103, 104	**ERD25TJ101**	Carbon, 100Ω, 1/4W, ± 5%	2	
R105, 106	**ERD14FJ472**	Carbon, 4.7kΩ, 1/4W, ± 5%	2	
R107, 108	**ERF3AJ220**	Non-Flammable, 22Ω, 3W, ± 5%	2	
R109, 110	ERD12TSJ123	Carbon, 12kΩ, 1/2W, ± 5%	2	
R111, 112	**ERD50TJ682**	Carbon, 6.8kΩ, 1/2W, ± 5%	2	
R113, 114	**ERD25TJ271**	Carbon, 270Ω, 1/4W, ± 5%	2	
R115, 116	ERO25CKF1803	Metallic, 180kΩ, 1/4W, ± 1%	2	
R117, 118	ERO25CKF2202	Metallic, 22kΩ, 1/4W, ± 1%	2	
R151, 152	**ERD25TJ104**	Carbon, 100kΩ, 1/4W, ± 5%	2	
R153, 154	**ERD25TJ272**	Carbon, 2.7kΩ, 1/4W, ± 5%	2	
R201, 202	**ERD25TJ224**	Carbon, 220kΩ, 1/4W, ± 5%	2	
R203, 204	**ERD25TJ561**	Carbon, 560Ω, 1/4W, ± 5%	2	
R205, 206	**ERD25TJ332**	Carbon, 3.3kΩ, 1/4W, ± 5%	2	
R207, 208	**ERD25TJ104**	Carbon, 100kΩ, 1/4W, ± 5%	2	
R209, 210	**ERD25TJ472**	Carbon, 4.7kΩ, 1/4W, ± 5%	2	
R211, 212	**ERD25TJ472**	Carbon, 4.7kΩ, 1/4W, ± 5%	2	
R213, 214	**ERD25TJ472**	Carbon, 4.7kΩ, 1/4W, ± 5%	2	
R215, 216	**ERD25TJ123**	Carbon, 12kΩ, 1/4W, ± 5%	2	
R217, 218	**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%	2	
R219, 220	**ERD25TJ102**	Carbon, 1kΩ, 1/4W, ± 5%	2	
R221, 222	**ERD25TJ472**	Carbon, 4.7kΩ, 1/4W, ± 5%	2	
R223, 224	**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ± 5%	2	
R225, 226	**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%	2	
R227, 228	**ERD25TJ332**	Carbon, 3.3kΩ, 1/4W, ± 5%	2	
R229, 230	**ERD25TJ391**	Carbon, 390Ω, 1/4W, ± 5%	2	
R231, 232	**ERD25TJ332**	Carbon, 3.3kΩ, 1/4W, ± 5%	2	
R233, 234	**ERD25TJ332**	Carbon, 3.3kΩ, 1/4W, ± 5%	2	
R235, 236	**ERD25TJ334**	Carbon, 330kΩ, 1/4W, ± 5%	2	
R237, 238	**ERD25TJ102**	Carbon, 1kΩ, 1/4W, ± 5%	2	
R239, 240	**ERD25TJ102**	Carbon, 1kΩ, 1/4W, ± 5%	2	
R241, 242	**ERD25TJ102**	Carbon, 1kΩ, 1/4W, ± 5%	2	
R243, 244	**ERD25TJ102**	Carbon, 1kΩ, 1/4W, ± 5%	2	
R245, 246	**ERD25TJ154**	Carbon, 150kΩ, 1/4W, ± 5%	2	
R249, 250	**ERD25TJ102**	Carbon, 1kΩ, 1/4W, ± 5%	2	
R251, 252	**ERD25TJ151**	Carbon, 150Ω, 1/4W, ± 5%	2	
R253, 254	**ERD25TJ392**	Carbon, 3.9kΩ, 1/4W, ± 5%	2	
R255, 256	**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ± 5%	2	
R257, 258	**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ± 5%	2	
R259, 260	**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%	2	
R261, 262	**ERD25TJ273**	Carbon, 27kΩ, 1/4W, ± 5%	2	
R263, 264	**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%	2	
R265, 266	**ERD25TJ334**	Carbon, 330kΩ, 1/4W, ± 5%	2	
R267, 268	**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ± 5%	2	
R269, 270	**ERC12GK335**	Solid, 3.3MΩ, 1/2W, ±10%	2	
R271, 272	**ERD25TJ222**	Carbon, 2.2kΩ, 1/4W, ± 5%	2	
R273, 274	**ERD25TJ222**	Carbon, 2.2kΩ, 1/4W, ± 5%	2	
R275, 276	**ERD25TJ562**	Carbon, 5.6kΩ, 1/4W, ± 5%	2	
R277, 278	**ERD25TJ393**	Carbon, 39kΩ, 1/4W, ± 5%	2	
R279, 280	**ERD25TJ562**	Carbon, 5.6kΩ, 1/4W, ± 5%	2	
R281, 282	**ERD25TJ562**	Carbon, 5.6kΩ, 1/4W, ± 5%	2	
R283, 284	**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ± 5%	2	
R285, 286	**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ± 5%	2	
R287, 288	**ERD25TJ683**	Carbon, 68kΩ, 1/4W, ± 5%	2	
R289, 290	**ERD25TJ683**	Carbon, 68kΩ, 1/4W, ± 5%	2	
R291, 292	**ERD25TJ562**	Carbon, 5.6kΩ, 1/4W, ± 5%	2	
R293	**ERD25TJ102**	Carbon, 1kΩ, 1/4W, ± 5%	1	
R294	**ERD25TJ561**	Carbon, 560Ω, 1/4W, ± 5%	1	
R297, 298	**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ± 5%	2	
R301, 302	**ERD25TJ472**	Carbon, 4.7kΩ, 1/4W, ± 5%	2	
R303, 304	**ERD25TJ472**	Carbon, 4.7kΩ, 1/4W, ± 5%	2	
R305	**ERD25TJ123**	Carbon, 12kΩ, 1/4W, ± 5%	1	
R306	**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ± 5%	1	
R307	**ERD25TJ393**	Carbon, 39kΩ, 1/4W, ± 5%	1	
R308, 309	**ERD25TJ273**	Carbon, 27kΩ, 1/4W, ± 5%	2	
R310	**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ± 5%	1	
R312	**ERD25TJ153**	Carbon, 15kΩ, 1/4W, ± 5%	1	
R313	**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ± 5%	1	
R314	**ERD25TJ184**	Carbon, 180kΩ, 1/4W, ± 5%	1	
R315	**ERD25TJ393**	Carbon, 39kΩ, 1/4W, ± 5%	1	
R316	**ERD25TJ272**	Carbon, 2.7kΩ, 1/4W, ± 5%	1	
R317	**ERD25TJ123**	Carbon, 12kΩ, 1/4W, ± 5%	1	
R318	**ERG1ANJ821**	Metallic, 820Ω, 1W, ± 5%	1	
R401	**ERD12FJ821**	Carbon, 820Ω, 1/2W, ± 5%	1	

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
VARIABLE RESISTORS				
VR201, 202	**EVLS3AA00B53**	LOG Amp. & −50dB Meter Adjustment, 5kΩ(B)	2	
VR203, 204	**EVLS3AA00B52**	+10 dB Meter Adjustment, 500Ω(B)	2	
VR205, 206	**EVLS3AA00B14**	−20 dB Meter Adjustment, 10kΩ(B)	2	
VR209, 210	**EVLS3AA00B15**	Hold Amplifier Adjustment, 100kΩ(B)	2	
VR211, 212	**EVLS3AA00B54**	Meter Position Adjustment, 50kΩ(B)	2	
VR213, 214	**EVLS3AA00B13**	Meter Drive Amplifier Adjustment, 1kΩ(B)	2	
VR301, 302	**EVLS3AA00B24**	Voltage Regulator Adjustment, 20kΩ(B)	2	
CAPACITORS				
C1, 2	ECNC4A103M	Paper, 0.01μF, 450V. AC, ±20%	2	
C201, 202	**ECEA50MR47R**	Electrolytic, 0.47μF, 50V	2	
C203, 204	**ECEA16V10**	Electrolytic, 10μF, 16V	2	
C205, 206	**ECEA16V47V**	Electrolytic, 47μF, 16V	2	
C207, 208	ECCD1H121K	Ceramic, 120pF, 50V, ±10%	2	
C209, 210	ECQM1H474KZ	Polyester, 0.47μF, 50V, ±10%	2	
C213, 214	ECCD1H331K	Ceramic, 330pF, 50V, ±10%	2	
C301, 302	**ECEA16V470V**	Electrolytic, 470μF, 16V	2	
C303, 304	**ECEA25V330V**	Electrolytic, 330μF, 25V	2	
C305, 306	**ECEA25V100V**	Electrolytic, 100μF, 25V	2	
C307, 308	**ECEA16V100V**	Electrolytic, 100μF, 16V	2	
C309, 310	**ECEA16V100V**	Electrolytic, 100μF, 16V	2	
C311	**ECEA35V4R7**	Electrolytic, 4.7μF, 35V	1	
C312	**ECEA6V220V**	Electrolytic, 220μF, 6.3V	1	
C401, 402	ECQM1H474KZ	Polyester, 0.47μF, 50V, ±10%	2	
C403	**ECEA50V1**	Electrolytic, 1μF, 50V	1	
FUSES				
F1	XBA2C02TR0	Fuse, 200mAT (250V), Power Source	1	○
F2, 3	XBA2C01TR0	Fuse, 100mAT (250V), Power Source	2	
F4	XBA2C06TR0	Fuse, 630mAT (250V), Power Source	1	
F5	XBA2C04TR0	Fuse, 400mAT (250V), Power Source	1	
SWITCHES				
S1 ~ S4	SSH409S	Switch, Input Selector & Meter Sensitivity	1	
S5	SSL27S	Switch, Meter Mode	1	
S6	SSS41	Switch, Speaker Impedance	1	○
S7	SSL5S	Switch, Power	1	
S8	ESE372	Switch, Voltage Selector	1	
RELAYS				
RELAY 1	SSYA8	Relay, Muting	1	
RELAY 2	SSY25	Relay, Meter Hold	1	
CABINET and CHASSIS PARTS				
1	SBLA4-3	Knob, Power & Meter Mode	2	
2	SBC129	Button, Input Selection, Sensitivity	4	
3	SKH47	Handle, Front Panel	2	
4	SGXA64	Bracket, Panel Handle	4	
5	SGWH9020X	Front Panel Ass'y	1	○
6	SKT3-1	Bracket, Panel	2	*
7	XNA6FFZ	Nut, Handle M'tg	4	
7-1	XWAR6BFZ	Washer (Spring), Handle Nut	4	

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
7-2	XWE6EFZ	Washer, Handle Nut	4	
8	XVE4B8FZS	Bolt, Side Board M'tg	4	
8-1	XWE4FZ	Washer, Side Board Bolt	4	
9	SKS1	Side Board	2	*
10	XTN3+8BFZ	Screw, Panel Bracket M'tg	6	
11	SHSA22	Shading Cloth, Power Switch	1	
12	SHSA23	Shading Cloth, Mode Switch	1	
13	SSM97	Meter	2	
14	SNW3211	Washer (Nylon), Meter	8	
15	XNG3BS	Nut, Meter M'tg	8	
15-1	XWA3B	Washer (Spring), Meter Nut	8	
15-2	XWG3B	Washer, Meter Nut	8	
16	SKU5350-1	Bottom Board	1	*
16-1	XTN3+8B	Screw, Bottom Board M'tg	7	
17	SKL151	Foot	4	
17-1	XTN3+16B	Screw, Foot M'tg	4	
18	SHRA306	Clamp, Lead Wire	2	
19	XSN3+6S	Screw, Switches M'tg	5	
	XWA3	Washer (Spring), Switches	5	
	XWG3	Washer, Switches	5	
20	SJF3803-1	Terminal, Input	1	
21	SGP95-1A	Rear Panel	1	○
21 [XSD, XSW] only	SGPH9020D	Rear Panel, SGP95-1A with Name Plate (SGT14810)	1	○
22	SHR401-1	Latch, Input Terminal M'tg	4	
23	SJFA5403	Terminal, Speaker Connection	1	
24	SHR127	Bushing, AC Cord	1	
24 [XE] only	SHR131	Bushing, AC Cord	1	
25 [X, XG, XGF]	SJA95	AC Cord, with AC Plug	1	
25 [XGH, XSD]	SJA81	AC Cord, with AC Plug	1	
25 [XE]	SJA73	AC Cord, with AC Plug	1	
25 [XSW]	**SJA68**	AC Cord, with AC Plug	1	
25-1	SGE361	Bracket, AC Cord	1	
25-1 [XE] only	SGE363	Bracket, AC Cord	1	
26	SGP9031	Plate, Hole Cover	1	○
27	XSB26+5FZ	Screw, Impedance Switch M'tg	2	
27-1	XWE3FZ	Washer	2	
28	SKP29-1	Top Board	1	○
28-1	XTN3+8BFZ	Screw, Top Board M'tg	7	
28-2	SNW329	Washer	7	
29	XTN3+8BFZ	Screw, Rear Panel & AC Cord Bracket	6	
30	XTN3+8B	Screw, Chassis & P.C.B. M'tg	13	
31	SJFA3	Holder, Fuse	1	
32	SMFA9	Bracket, Fuse Holder	1	* ○
33	XTN3+8B	Screw, P.C.B. M'tg	1	
34	XWC3B	Toothed Ring	1	
35	XNG3BS	Nut, Voltage Selector Switch M'tg	2	
36	XWA3B	Washer, Spring	2	
37	SUDA41	Sleeve, Voltage Selector Switch	2	
38	XSN3+14BVS	Screw, Voltage Selector Switch M'tg	2	
39	XTN4+8B	Screw, Power Transformer M'tg	2	
40	SJR205	Terminal Strip, 2pin	1	
ACCESSORIES				
A1	**SJP2129**	Cord, Shield	1	
A2	SWX289	Cord, Viny-covered	2	
A3	SKL117	Foot, Adapter	4	
A4	XTN3+8B	Screw, Foot M'tg	4	
	XWG3	Washer	4	
A5	SJPA11-1	Short Pin, Insert to "IN" terminals of Input2	2	
A6 [X] only	SJP5213	Plug Adapter, AC Power Source	1	

■ PACKINGS



Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
		PACKING PARTS		
P1	SPP495	Soft Cover	1	
P2	SPS109-1	Pad, Left & Right Side	2	
P3	SPS1011	Pad, Front Side	1	
P3 [XGH, XSD] only	SPS853	Pad, Front Side	1	
P4 [XGH, XSD] only	SPS1107	Pad, Botton Side	1	O
P5 [X]	SPN5223	Carton Box	1	O
P5 [XGF]	SPG1183	Carton Box	1	O
P5 [XG, XE, XSW]	SPG1181	Carton Box	1	O
P5 [XGH, XSD]	SPG1185	Carton Box	1	O
P6	SQF1673	Instructions Book, Printed Matter	1	O
P6 [XE] only	SQF1675	Instructions Book, Printed Matter	1	O

Notes: [X] is available in Asia, Latin America, Middle East and Africa only.
[XG] is available in European only.
[XGH] is available in Holland only.
[XGF] is available in France only.
[XSD] is available in Scandinavia only.
[XSW] is available in Switzerland only.
[XE] is available in England only.

■ ACCESSORIES